

HEXFET® TRANSISTOR

IRLF230

N-CHANNEL

200Volt, 0.40 Ω , HEXFET

The Logic Level 'L' series of power MOSFETs are designed to be operated with level logic gate-to-source voltage of 5V. In addition to the well established characteristics of HEXFETs, they have the added advantage of providing low drive requirements to interface power loads to logic level IC's and microprocessors.

Fields of application include: high speed power applications such as switching regulators, switching converters, motor drivers, solenoid and relay drivers.

The HEXFET technology is the key to International Rectifier's advance line of logic level power MOSFET transistors. The efficient geometry and unique processing of the HEXFET achieve very low on-state resistance combine with high transconductance.

Product Summary

Part Number	BV _{DSS}	R _{DS(on)}	I _D
IRLF230	200V	0.40 Ω	5.2A

Features:

- Dynamic dv/dt Rating
- Logic Level Gate Drive
- R_{DS(on)} Specific at V_{GS} = 4V & 5V
- 150°C Operating Temperature
- Fast Switching
- Ease of Paralleling

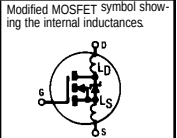
Absolute Maximum Ratings

	Parameter	IRLF230	Units
I _D @ V _{GS} = 5.0V, T _C = 25°C	Continuous Drain Current	5.2	A
I _D @ V _{GS} = 5.0V, T _C = 100°C	Continuous Drain Current	3.3	
I _{DM}	Pulsed Drain Current ①	20	
P _D @ T _C = 25°C	Max. Power Dissipation	25	W
	Linear Derating Factor	0.20	W/K ⑤
V _{GS}	Gate-to-Source Voltage	±10	V
dv/dt	Peak Diode Recovery dv/dt ③	4.2	V/ns
T _J	Operating Junction	-55 to 150	°C
T _{STG}	Storage Temperature Range		
	Lead Temperature	300(0.063 in.(1.6mm) from case for 10s)	
	Weight	0.98 (typical)	g

IRLF230

Electrical Characteristics @ T_j = 25°C (Unless Otherwise Specified)

	Parameter	Min	Typ	Max	Units	Test Conditions
BV _{DSS}	Drain-to-Source Breakdown Voltage	200	—	—	V	V _{GS} = 0 V, I _D = 250μA
ΔBV _{DSS} /ΔT _J	Temperature Coefficient of Breakdown Voltage	—	0.28	—	V/°C	Reference to 25°C, I _D = 250μA
R _{DS(on)}	Static Drain-to-Source On-State Resistance	—	—	0.40	Ω	V _{GS} = 5.0V, I _D = 3.1A ④
		—	—	0.50		V _{GS} = 4.0V, I _D = 2.6A
V _{GS(th)}	Gate Threshold Voltage	1.0	—	2.0	V	V _{DS} = V _{GS} , I _D = 250μA
g _{fs}	Forward Transconductance	4.5	—	—	S (r)	V _{DS} > 15V, I _{DS} = 3.1A ④
I _{DSS}	Zero Gate Voltage Drain Current	—	—	25	μA	V _{DS} = 0.8 x Max Rating, V _{GS} = 0V
		—	—	250		V _{DS} = 0.8 x Max Rating V _{GS} = 0V, T _J = 125°C
I _{GSS}	Gate-to-Source Leakage Forward	—	—	100	nA	V _{GS} = 10 V
I _{GSS}	Gate-to-Source Leakage Reverse	—	—	-100		V _{GS} = -10V
Q _g	Total Gate Charge	—	—	41	nC	V _{GS} = 5.0V, I _D = 5.2A V _{DS} = Max Rating x 0.5
Q _{gs}	Gate-to-Source Charge	—	—	4.9		
Q _{gd}	Gate-to-Drain ('Miller') Charge	—	—	21		
t _{d(on)}	Turn-On Delay Time	—	—	9.4	ns	V _{DD} = 100V, I _D = 5.2A, R _G = 6.0Ω
t _r	Rise Time	—	—	34		
t _{d(off)}	Turn-Off Delay Time	—	—	43		
t _f	Fall Time	—	—	26		
L _D	Internal Drain Inductance	—	5.0	—	nH	Measured from drain lead, 6mm (0.25 in) from package to center of die.
L _S	Internal Source Inductance	—	15	—		Measured from source lead, 6mm (0.25 in) from package to source bonding pad.
C _{iss}	Input Capacitance	—	1100	—	pF	V _{GS} = 0V, V _{DS} = 25 V f = 1.0MHz
C _{oss}	Output Capacitance	—	230	—		
C _{rss}	Reverse Transfer Capacitance	—	61	—		



Source-Drain Diode Ratings and Characteristics

	Parameter	Min	Typ	Max	Units	Test Conditions
I _S	Continuous Source Current (Body Diode)	—	—	5.2	A	Modified MOSFET symbol showing the integral reverse p-n junction rectifier. 
I _{SM}	Pulse Source Current (Body Diode) ①	—	—	20		
V _{SD}	Diode Forward Voltage	—	—	2.0	V	T _J = 25°C, I _S = 5.2A, V _{GS} = 0V ④
t _{rr}	Reverse Recovery Time	—	—	250	ns	T _J = 25°C, I _F = 5.2A, di/dt ≤ 100A/μs V _{DD} ≤ 50V ④
Q _{RR}	Reverse Recovery Charge	—	—	1.7	μC	
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by L _S + L _D .				



Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
R _{thJC}	Junction-to-Case	—	—	5.0	K/W	
R _{thJA}	Junction-to-Ambient	—	—	175		Typical socket mount

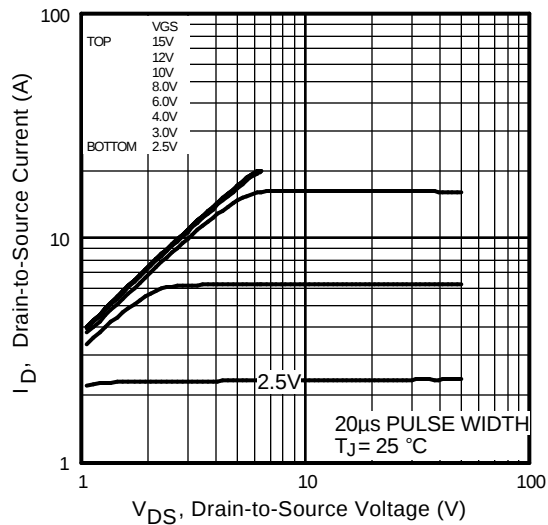


Fig 1. Typical Output Characteristics

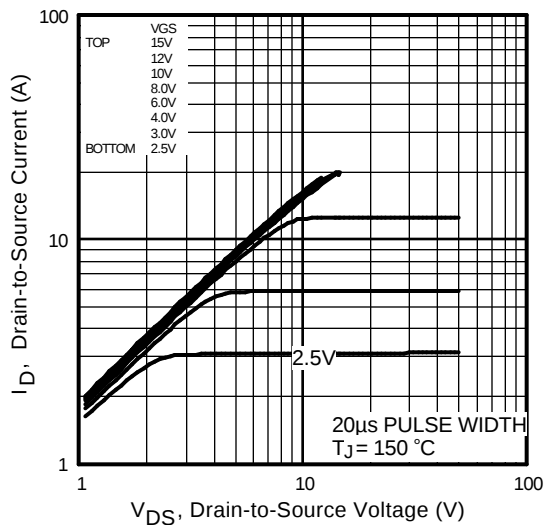


Fig 2. Typical Output Characteristics

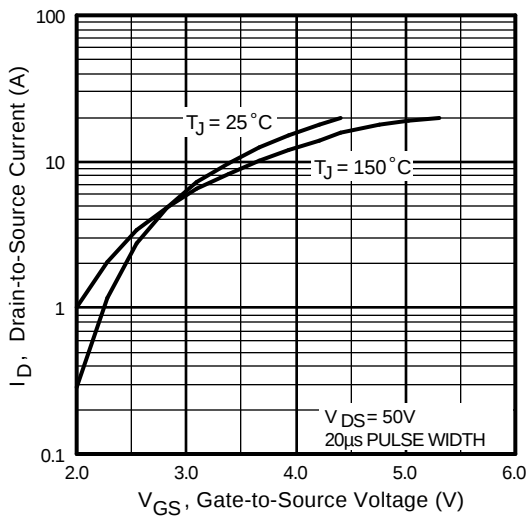


Fig 3. Typical Transfer Characteristics

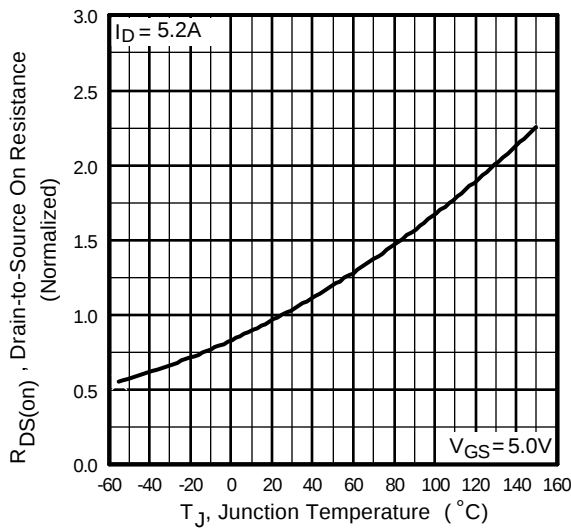


Fig 4. Normalized On-Resistance Vs. Temperature

IRLF230

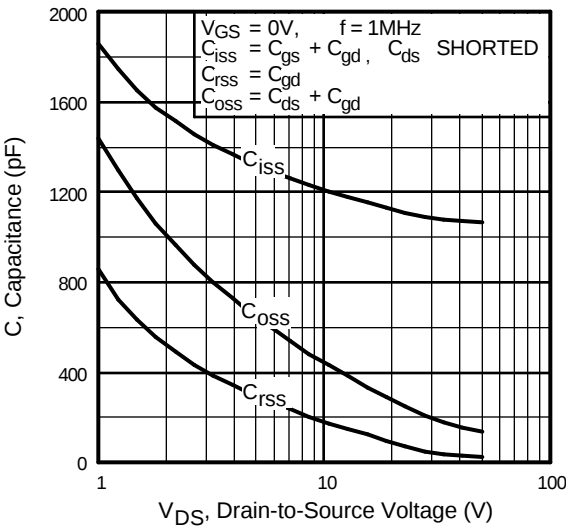


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

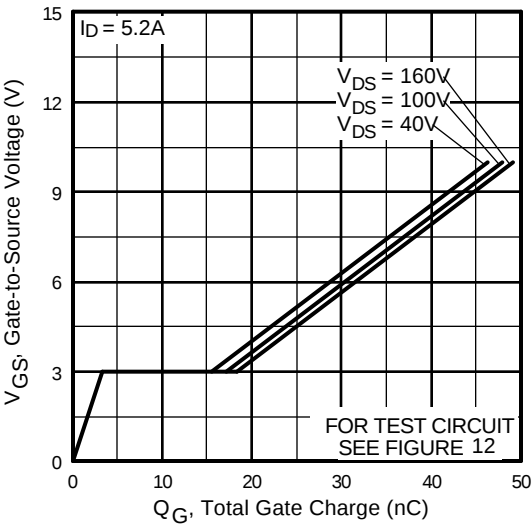


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

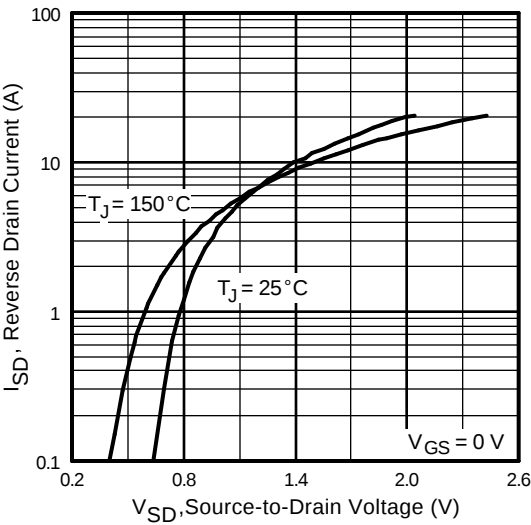


Fig 7. Typical Source-Drain Diode Forward Voltage

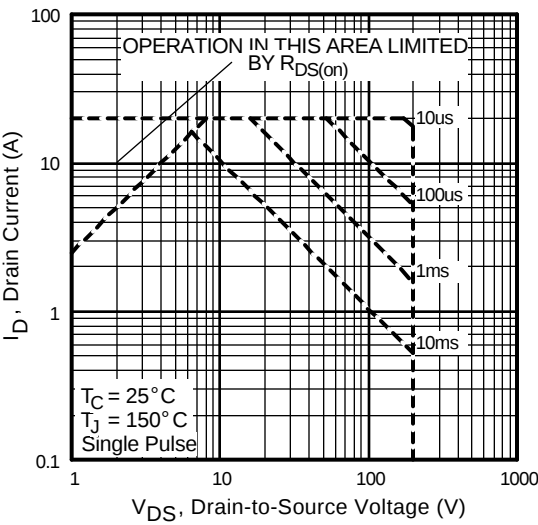


Fig 8. Maximum Safe Operating Area

IRLF230

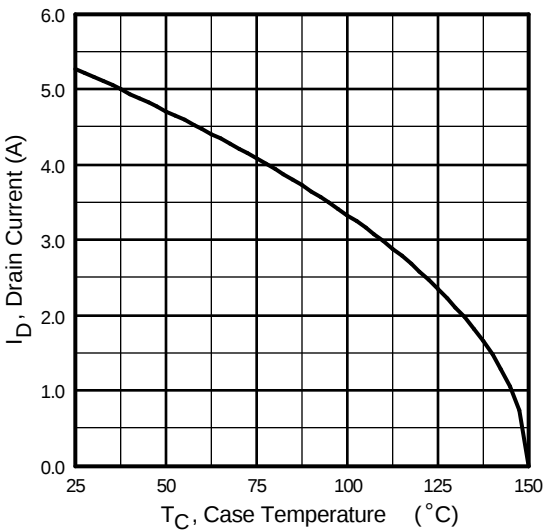


Fig 9. Maximum Drain Current Vs. Case Temperature

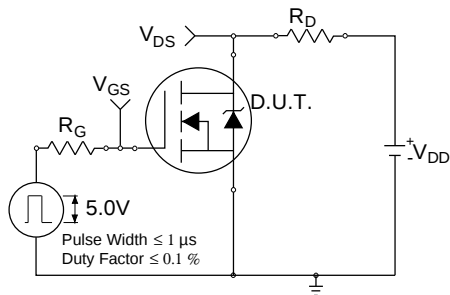


Fig 10a. Switching Time Test Circuit

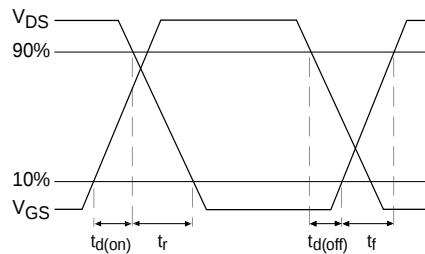


Fig 10b. Switching Time Waveforms

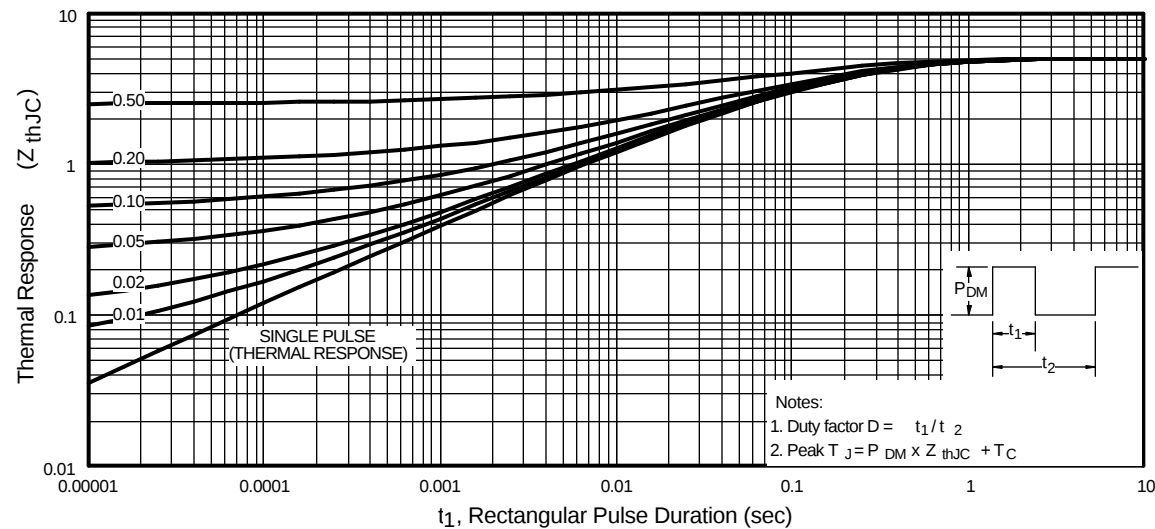


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

IRLF230

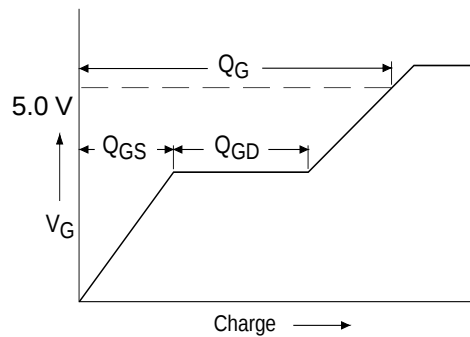


Fig 12a. Basic Gate Charge Waveform

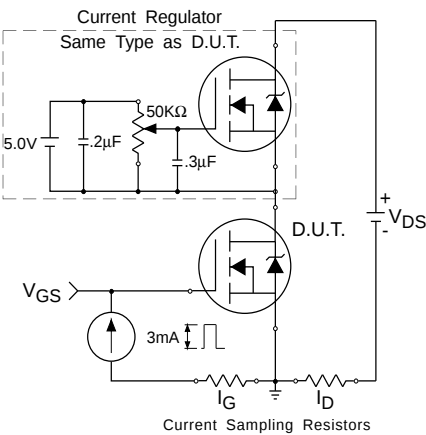


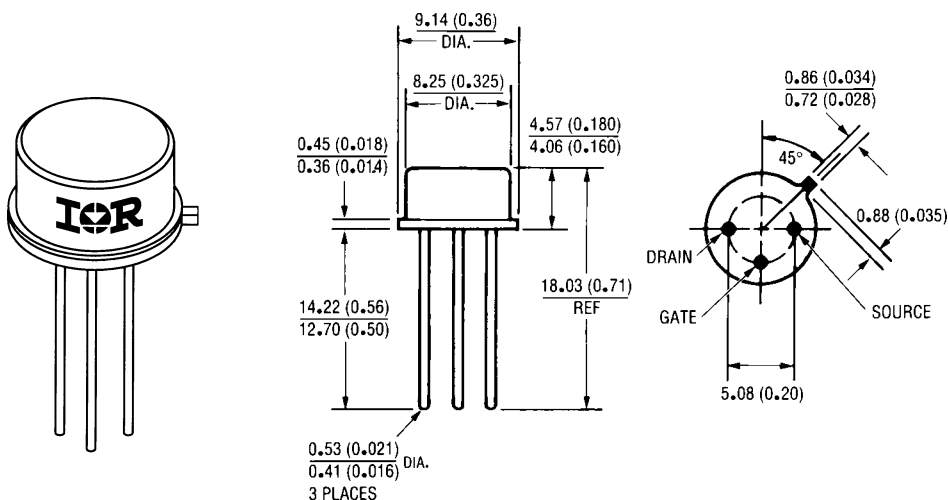
Fig 12b. Gate Charge Test Circuit

IRLF230

Notes:

- ① Repetitive Rating; Pulse width limited by maximum junction temperature.
Refer to current HEXFET reliability report.
- ② $K/W = ^\circ C/W$
- ③ $I_{SD} \leq 5.2A$, $di/dt \leq 270 A/\mu s$,
 $V_{DD} \leq BVD_{SS}$, $T_J \leq 150^\circ C$
Suggested $R_G = 2.35\Omega$
- ④ Pulse width $\leq 300 \mu s$; Duty Cycle $\leq 2\%$

Case Outline and Dimensions — TO-205AF (Modified TO-39)



All dimensions are shown millimeters (inches)

International
IOR Rectifier

WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, Tel: (310) 322 3331

EUROPEAN HEADQUARTERS: Hurst Green, Oxted, Surrey RH8 9BB, UK Tel: ++ 44 1883 732020

IR CANADA: 7321 Victoria Park Ave., Suite 201, Markham, Ontario L3R 2Z8, Tel: (905) 475 1897

IR GERMANY: Saalburgstrasse 157, 61350 Bad Homburg Tel: ++ 49 6172 96590

IR ITALY: Via Liguria 49, 10071 Borgaro, Torino Tel: ++ 39 11 451 0111

IR FAR EAST: K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo Japan 171 Tel: 81 3 3983 0086

IR SOUTHEAST ASIA: 315 Outram Road, #10-02 Tan Boon Liat Building, Singapore 0316 Tel: 65 221 8371

<http://www.irf.com/>

Data and specifications subject to change without notice.

4/97